

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1 **Claim 1 (currently amended):** A multiband data
2 communication apparatus which receives signals by switching
3 a plurality of frequency bands in response to a band
4 switching signal, said multiband data communication
5 apparatus comprising:
6 quadrature demodulating means for converting either a
7 reception signal or a reception intermediate frequency
8 signal into a quadrature reception baseband signal, said
9 quadrature demodulating means including:
10 a pair of first quadrature mixers for converting
11 either the reception signal or the reception intermediate
12 frequency signal into a reception baseband signal;
13 local oscillating means for producing a local
14 oscillation signal; and
15 phase shifting means for inputting said band switching
16 signal and for shifting a phase of said local oscillation
17 signal based upon said band switching signal to thereby
18 supply the phase-shifted local oscillation signal to one or
19 both of said pair of first quadrature mixers; wherein
20 said local oscillation signal is provided to another
21 of said pair of first quadrature mixers with a phase
22 shifted or not shifted without regard to said band
23 switching signal.

24 **Claim 2 (currently amended):** A multiband data
25 communication apparatus which transmits signals by
26 switching a plurality of frequency band in response to a
27 band switching signal, said multiband data communication
28 apparatus comprising:

29 quadrature modulating means for converting a
30 quadrature transmission baseband signal into either a
31 transmission signal or a transmission intermediate
32 frequency signal, said quadrature modulating means
33 including:

34 a pair of second quadrature mixers for converting a
35 transmission baseband signal into either the transmission
36 signal or the transmission intermediate frequency signal;

37 local oscillating means for producing a local
38 oscillation signal; and

39 phase shifting means for inputting said band switching
40 signal and for shifting a phase of said local oscillation
41 signal based upon said band switching signal to thereby
42 supply the phase-shifted local oscillation signal to one or
43 both of said pair of second quadrature mixers; wherein

44 said local oscillation signal is provided to another
45 of said pair of first quadrature mixers with a phase
46 shifted or not shifted without regard to said band
47 switching signal.

1 **Claim 3 (previously presented):** A multiband data
2 communication apparatus comprising:

3 quadrature modulating means for converting a
4 quadrature transmission baseband signal into either a
5 transmission signal or a transmission intermediate
6 frequency signal;

7 quadrature demodulating means for converting either a
8 reception signal or a reception intermediate frequency
9 signal into a quadrature reception baseband signal; and

10 local oscillation signal producing means for supplying
11 a local oscillation signal to both said quadrature
12 modulating means and said quadrature demodulating means,
13 for transmitting/receiving by switching a plurality of
14 frequency bands in response to a band switching signal,

15 wherein said quadrature demodulating means includes a
16 pair of first quadrature mixers for converting either the
17 reception signal or the reception intermediate frequency
18 signal into a reception baseband signal; and wherein

19 said quadrature modulating means includes a pair of
20 second quadrature mixers for converting a transmission
21 baseband signal into either the transmission signal or the
22 transmission intermediate frequency signal; and further
23 wherein

24 said local oscillation signal producing means includes
25 local oscillating means for producing a local oscillation
26 signal, and said apparatus further comprises

27 phase shifting means for shifting a phase of said
28 local oscillation signal based upon said band switching
29 signal to thereby supply the phase-shifted local
30 oscillation signal to one or both of said pair of first

31 quadrature mixers and to one or both of said pair of second
32 quadrature mixers.

1 **Claim 4 (previously presented):** A multiband data
2 communication apparatus as claimed in claim 3, wherein
3 said phase shifting means supplies a signal obtained by
4 shifting the phase of said local oscillation signal by $\pi/2$
5 to one of said pair of first quadrature mixers and one of
6 said pair of second quadrature mixers, while said phase
7 shifting means supplies one of said local oscillation
8 signal and a signal obtained by inverting a code of said
9 local oscillation signal to the other of said pair of first
10 quadrature mixers and to the other of said pair of second
11 quadrature mixers in response to said band switching
12 signal.

1 **Claim 5 (previously presented):** A multiband data
2 communication apparatus as claimed in claim 3, wherein said
3 phase shifting means supplies said local oscillation signal
4 to one of said pair of first quadrature mixers and to one
5 of said pair of second quadrature mixers; while said phase
6 shifting means supplies one of a signal obtained by
7 shifting the phase of said local oscillation signal by $\pi/2$
8 and a signal obtained by shifting the phase of said local
9 oscillation signal by $\pi/2$ and by then inverting said phase-
10 shifted local oscillation signal to the other mixer of said
11 pair of first quadrature mixers and also to the other mixer

12 of said pair of second quadrature mixers in response to
13 said band switching signal.

1 **Claim 6 (previously presented):** A multiband data
2 communication apparatus as claimed in claim 3, wherein said
3 phase shifting means supplies said local oscillation signal
4 to one of said pair of first quadrature mixers and to one
5 of said pair of second quadrature mixers, while said phase
6 shifting means supplies one of a signal obtained by
7 delaying the phase of said local oscillation signal by $\pi/2$
8 and a signal obtained by advancing the phase of said local
9 oscillation signal by $\pi/2$ to the other of said pair of
10 first quadrature mixers and also to the other of said pair
11 of second quadrature mixers in response to said band
12 switching signal.

1 **Claim 7 (previously presented):** A multiband data
2 communication apparatus which receives signals by switching
3 a plurality of frequency bands in response to a band
4 switching signal, said multiband data communication
5 apparatus comprising:

6 quadrature demodulating means for converting either a
7 reception signal or a reception intermediate frequency
8 signal into quadrature reception baseband signal, said
9 quadrature demodulating means including:

10 a pair of first quadrature mixers for converting
11 either the reception signal or the reception intermediate
12 frequency signal into a reception baseband signal;

13 storage means for saving thereinto discrete data a
14 frequency pattern component functioning as a base;
15 address generating means for generating an address
16 every preselected clock;
17 phase shift means for adding a predetermined number
18 based upon said band switching signal to said address;
19 first analog converting means for analog-converting
20 data which is read out by addressing said storage means
21 based on the address outputted from said address generating
22 means to thereby supply the analog-converted data to one of
23 said pair of first quadrature mixers; and
24 second analog converting means for analog-converting
25 data which is read out by addressing said storage means
26 based on the output of said phase shift means to thereby
27 supply the analog-converted data to the other of said pair
28 of first quadrature mixers.

1 **Claim 8 (previously presented):** A multiband data
2 communication apparatus which transmits signals by
3 switching a plurality of frequency band in response to a
4 band switching signal, said multiband data communication
5 apparatus comprising:

6 quadrature modulating means for converting a
7 quadrature transmission baseband signal into either a
8 transmission signal or a transmission intermediate
9 frequency signal, said quadrature modulating means
10 including:

11 a pair of second quadrature mixers for converting a
12 transmission baseband signal into either the transmission
13 signal or the transmission intermediate frequency signal;
14 storage means for saving thereinto discrete data of a
15 frequency pattern component functioning as a base address
16 generating means for generating an address every
17 preselected clock;
18 phase shift means for adding a predetermined number
19 based upon said band switching signal to said address;
20 first analog converting means for analog-converting
21 data which is read out by addressing said storage means
22 based on the address outputted from said address generating
23 means to thereby supply the analog-converted data to one of
24 said pair of second quadrature mixers; and
25 second analog converting means for analog-converting
26 data which is read out by addressing said storage means
27 based on the output of said phase shift means to thereby
28 supply the analog-converted data to the other of said pair
29 of second quadrature mixers.

1 **Claim 9 (previously presented):** A multiband data
2 communication apparatus comprising:
3 quadrature modulating means for converting a
4 quadrature transmission baseband signal into either a
5 transmission signal or a transmission intermediate
6 frequency signal;

7 quadrature demodulating means for converting either a
8 reception signal or a reception intermediate frequency
9 signal into a quadrature reception baseband signal; and
10 local signal producing means for supplying a local
11 oscillation signal to both said quadrature modulating means
12 and said quadrature demodulating means, for transmitting/
13 receiving by switching a plurality of frequency bands in
14 response to a band switching signal, wherein
15 said quadrature demodulating means includes a pair of
16 first quadrature mixers for converting either the reception
17 signal or the reception intermediate frequency signal into
18 a reception baseband signal; and further wherein
19 said quadrature modulating means includes a pair of
20 second quadrature mixers for converting a transmission
21 baseband signal into either the transmission signal or the
22 transmission intermediate frequency signal; and still
23 further wherein
24 said local oscillation signal producing means includes
25 storage means for saving thereinto discrete data of a
26 frequency pattern component functioning as a base; address
27 generating means for generating an address every
28 preselected clock; phase shift means for adding a
29 predetermined number based upon said band switching signal
30 to said address; first analog converting means for analog-
31 converting data which is read out by addressing said
32 storage means based on the address outputted from said
33 address generating means to thereby supply the analog-
34 converted data to one of said pair of first quadrature

35 mixers; and second analog converting means for analog-
36 converting data which is read out by addressing said
37 storage means based on the output of said phase shift means
38 to thereby supply the analog-converted data to the other of
39 said pair of first quadrature mixers.

1 **Claim 10 (previously presented):** A multiband data
2 communication apparatus as claimed in claim 9, wherein
3 either said quadrature modulating means or said local
4 oscillation signal producing means includes clock
5 generating means for generating a clock signal and interval
6 determining means for determining a clock interval used to
7 read out data from said storage means so as to control the
8 address generating operation of said address generating
9 means.

1 **Claim 11 (currently amended):** A communication method
2 of a multiband data communication apparatus including
3 quadrature demodulating means for converting either a
4 reception signal or a reception intermediate frequency
5 signal into a quadrature reception baseband signal, for
6 receiving by switching a plurality of frequency bands in
7 response to a band switching signal, said communication
8 method comprising the steps of:

9 producing a local oscillation signal;
10 providing said band switching signal to a means for
11 shifting a phase for controlling said means for shifting a
12 phase; and

13 using said means for shifting a phase for shifting a
14 phase of said local oscillation signal in response to said
15 band switching signal to thereby supply the phase-shifted
16 local oscillation signal to a first quadrature mixer for
17 converting either the reception signal or the reception
18 intermediate frequency signal into a reception baseband
19 signal; and

20 providing said local oscillation signal, with said
21 phase shifted or not shifted without regard to said band
22 switching signal, to a second quadrature mixer, also for
23 converting either the reception signal or the reception
24 intermediate frequency signal into a reception baseband
25 signal.

1 **Claim 12 (currently amended):** A communication method
2 of a multiband data communication apparatus including
3 quadrature modulating means for converting a quadrature
4 transmission baseband signal into either a transmission
5 signal or a transmission intermediate frequency signal, for
6 transmitting by switching a plurality of frequency band in
7 response to a band switching signal, said communication
8 method comprising the steps of:

9 producing a local oscillation signal;

10 providing said band switching signal to a means for
11 shifting a phase for controlling said means for shifting a
12 phase;

13 providing said local oscillation signal, with said
14 phase shifted or not shifted without regard to said band
15 switching signal, to a first quadrature mixer; and
16 using said means for shifting a phase for shifting a
17 phase of said local oscillation signal in response to said
18 band switching signal to thereby supply the phase-shifted
19 local oscillation signal to a second quadrature mixer for
20 converting a transmission baseband signal into either the
21 transmission signal or the transmission intermediate
22 frequency signal.

1 **Claim 13 (previously presented):** A communication
2 method of a multiband data communication apparatus
3 including quadrature modulating means for converting a
4 quadrature transmission baseband signal into either a
5 transmission signal or a transmission intermediate
6 frequency signal; and quadrature demodulating means for
7 converting either a reception signal or a reception
8 intermediate frequency signal into a quadrature reception
9 baseband signal wherein said apparatus transmits and
10 receives signals by switching a plurality of frequency
11 bands in response to a band switching signal, said
12 communication method comprising the steps of:

13 producing a local oscillation signal; and
14 shifting a phase of said local oscillation signal in
15 response to the band switching signal to thereby supply the
16 phase-shifted local oscillation signal to one or both of a
17 first quadrature mixer and a second quadrature mixer, said

18 first quadrature mixer converting either the reception
19 signal or the reception intermediate frequency signal into
20 a reception baseband signal, and said second quadrature
21 mixer converting a transmission baseband signal into either
22 the transmission signal or the transmission intermediate
23 frequency signal.

1 **Claim 14 (previously presented):** A communication
2 method of a multiband data communication apparatus as
3 claimed in claim 13, wherein said phase shifting step
4 includes:

5 a first supplying step for supplying a signal which is
6 obtained by shifting the phase of said local oscillation
7 signal by $\pi/2$ to one of said first quadrature mixer and
8 said second quadrature mixer;

9 an inverting step for inverting a code of said local
10 oscillation signal; and

11 a second supplying step for supplying one of said
12 local oscillation signal and the output signal of said
13 inverting step to the other of said first quadrature mixer
14 and said second quadrature mixer in response to said band
15 switching signal.

1 **Claim 15 (previously presented):** A communication
2 method of a multiband data communication apparatus as
3 claimed in claim 13, wherein said phase shifting step
4 includes:

5 a first supplying step for supplying said local
6 oscillation signal to one of said first quadrature mixer
7 and said second quadrature mixer;

8 a phase shifting step for shifting the phase of said
9 local oscillation signal by $\pi/2$;

10 an inverting step for inverting a code of said output
11 signal of said phase shifting step; and

12 a second supplying step for supplying one of said
13 output signal of said phase shifting step and the output
14 signal of said inverting step to the other of said first
15 quadrature mixer and said second quadrature mixer in
16 response to said band switching signal.

1 **Claim 16 (previously presented):** A communication
2 method of a multiband data communication apparatus as
3 claimed in claim 13, wherein said phase shifting step
4 includes:

5 a first supplying step for supplying said local
6 oscillation signal to one of said first quadrature mixer
7 and said second quadrature mixer;

8 a phase delaying step for delaying the phase of said
9 local oscillation signal by $\pi/2$;

10 a phase advancing step for advancing the phase of said
11 local oscillation signal by $\pi/2$; and

12 a second supplying step for supplying one of the
13 output signal of said phase delaying step and the output
14 signal of said phase advancing step to the other of said

15 first quadrature mixer and said second quadrature mixer in
16 response to said band switching signal.

1 **Claim 17 (previously presented):** A communication
2 method of a multiband data communication apparatus
3 including quadrature demodulating means for converting
4 either a reception signal or a reception intermediate
5 frequency signal into a quadrature reception baseband
6 signal, for receiving by switching a plurality of frequency
7 bands in response to a band switching signal, said
8 communication method comprising:

9 a storing step for saving discrete data of a frequency
10 pattern component functioning as a base;

11 an address generating step for generating an address
12 every preselected clock signal;

13 a phase shifting step for adding a predetermined
14 number based upon said band switching signal to said
15 address;

16 a first analog converting step for analog-converting
17 data which is read out by addressing said storing step
18 based on the address outputted from said address generating
19 step to thereby supply the analog-converted data to one of
20 a pair of first quadrature mixers for converting either the
21 reception signal or the reception intermediate frequency
22 signal into a reception baseband signal; and

23 a second analog converting step for analog-converting
24 data which is read out by addressing said storing step
25 based on the output of said phase shifting step to thereby

26 supply the analog-converted data to the other of said first
27 quadrature mixers.

1 **Claim 18 (previously presented):** A communication
2 method of a multiband data communication apparatus
3 including quadrature modulating means for converting a
4 quadrature transmission baseband signal into either a
5 transmission signal or a transmission intermediate
6 frequency signal, for transmitting by switching a plurality
7 of frequency band in response to a band switching signal,
8 said communication method comprising:

9 a storing step for saving discrete data of a frequency
10 pattern component functioning as a base;

11 an address generating step for generating an address
12 every preselected clock signal;

13 a phase shifting step for adding a predetermined
14 number based upon said band switching signal to said
15 address;

16 a first analog converting step for analog-converting
17 data which is read out by addressing said storing step
18 based on the address outputted from said address generating
19 step to thereby supply the analog-converted data to one of
20 a pair of second quadrature mixers for converting a
21 transmission baseband signal into either the transmission
22 signal or the transmission intermediate frequency signal;
23 and

24 a second analog converting step for analog-converting
25 data which is read out by addressing said storing step

26 based on the output of said phase shifting step to thereby
27 supply the analog-converted data to the other of said
28 second quadrature mixers.

1 **Claim 19 (previously presented):** A communication
2 method of a multiband data communication apparatus
3 including quadrature modulating means for converting a
4 quadrature transmission baseband signal into either a
5 transmission signal or a transmission intermediate
6 frequency signal; and quadrature demodulating means for
7 converting either a reception signal or a reception
8 intermediate frequency signal into a quadrature reception
9 baseband signal; and for transmitting/receiving by
10 switching a plurality of frequency bands in response to a
11 band switching signal, said communication method
12 comprising:

13 a storing step for saving discrete data of a frequency
14 pattern component functioning as a base;

15 an address generating step for generating an address
16 every preselected clock signal;

17 a phase shifting step for adding a predetermined
18 number based upon said band switching signal to said
19 address;

20 a first analog converting step for analog-converting
21 data which is read out by addressing said storing step
22 based on the address outputted from said address generating
23 step to thereby supply the analog-converted data to one of
24 a first quadrature mixer and a second quadrature mixer,

25 said first quadrature mixer converting either the reception
26 signal or the reception intermediate frequency signal into
27 a reception baseband signal, and said second quadrature
28 mixer converting a transmission baseband signal into either
29 the transmission signal or the transmission intermediate
30 frequency signal; and

31 a second analog converting step for analog-converting
32 data which is read out by addressing said storing step
33 based on the output of said phase shifting step to thereby
34 supply the analog-converted data to the other of said first
35 quadrature mixer and said second quadrature mixer.

1 **Claim 20 (original):** A storage medium for storing
2 thereinto a computer readable program used to execute the
3 communication method of the multiband data communication
4 apparatus as recited in claim 11, 12, 13, 14, 15, 16, 17,
5 18, or 19.

1 **Claim 21 (currently amended):** A multiband data
2 communication apparatus which receives signals by switching
3 a plurality of frequency bands in response to a band
4 switching signal, said multiband data communication
5 apparatus comprising:

6 quadrature demodulating means for converting either a
7 reception signal or a reception intermediate frequency
8 signal into a quadrature reception baseband signal, said
9 quadrature demodulating means including:

10 a pair of first quadrature mixers for converting
11 either the reception signal or the reception intermediate
12 frequency signal into a reception baseband signal;

13 local oscillating means for producing a local
14 oscillation signal;

15 phase shifting means for shifting a phase of said
16 local oscillation signal for input to one of said pair of
17 first quadrature mixers without regard to said band
18 switching signal; and

19 means for optionally changing a phase of said local
20 oscillation signal for input to another of said pair of
21 first quadrature mixers based upon said band switching
22 signal to thereby ensure correct polarities of quadrature
23 components of said reception baseband signal.

1 **Claim 22 (previously presented):** A multiband data
2 communication apparatus which receives signals by switching
3 a plurality of frequency bands in response to a band
4 switching signal, said multiband data communication
5 apparatus comprising:

6 quadrature demodulating means for converting either a
7 reception signal or a reception intermediate frequency
8 signal into a quadrature reception baseband signal, said
9 quadrature demodulating means including:

10 a pair of first quadrature mixers for converting
11 either the reception signal or the reception intermediate
12 frequency signal into a reception baseband signal;

13 local oscillating means for producing a local
14 oscillation signal; and

15 phase shifting means for inputting said band switching
16 signal for shifting a phase of said local oscillation
17 signal to ensure consistent polarities of quadrature
18 components of said reception baseband signal irrespective
19 of an operating band of the apparatus.

1 **Claim 23 (previously presented):** A multiband data
2 communication apparatus as claimed in claim 1, wherein said
3 phase shifting means supplies a signal obtained by shifting
4 the phase of said local oscillation signal by $\pi/2$ to one of
5 said pair of first quadrature mixers, while said phase
6 shifting means supplies one of said local oscillation
7 signal and a signal obtained by inverting a code of said
8 local oscillation signal to the other of said pair of first
9 quadrature mixers in response to said band switching
10 signal.

1 **Claim 24 (previously presented):** A multiband data
2 communication apparatus as claimed in claim 1, wherein said
3 phase shifting means supplies said local oscillation signal
4 to one of said pair of first quadrature mixers while said
5 phase shifting means supplies one of a signal obtained by
6 shifting the phase of said local oscillation signal by $\pi/2$
7 and a signal obtained by shifting the phase of said local
8 oscillation signal by $\pi/2$ and then inverting said phase-
9 shifted local oscillation signal to the other mixer of said

10 pair of first quadrature mixers in response to said band
11 switching signal.

1 **Claim 25 (previously presented):** A multiband data
2 communication apparatus as claimed in claim 1, wherein said
3 phase shifting means supplies said local oscillation signal
4 to one of said pair of first quadrature mixers, while said
5 phase shifting means supplies one of a signal obtained by
6 delaying the phase of said local oscillation signal by $\pi/2$
7 and a signal obtained by advancing the phase of said local
8 oscillation signal by $\pi/2$ to the other of said pair of
9 first quadrature mixers in response to said band switching
10 signal.

1 **Claim 26 (previously presented):** A multiband data
2 communication apparatus as claimed in claim 2, wherein said
3 phase shifting means supplies a signal obtained by shifting
4 the phase of said local oscillation signal by $\pi/2$ to one of
5 said pair of second quadrature mixers, while said phase
6 shifting means supplies one of said local oscillation
7 signal and a signal obtained by inverting a code of said
8 local oscillation signal to the other of said pair of
9 second quadrature mixers in response to said band switching
10 signal.

1 **Claim 27 (previously presented):** A multiband data
2 communication apparatus as claimed in claim 2, wherein said
3 phase shifting means supplies said local oscillation signal

4 to one of said pair of second quadrature mixers while said
5 phase shifting means supplies one of a signal obtained by
6 shifting the phase of said local oscillation signal by $\pi/2$
7 and a signal obtained by shifting the phase of said local
8 oscillation signal by $\pi/2$ and then inverting said phase-
9 shifted local oscillation signal to the other mixer of said
10 pair of second quadrature mixers in response to said band
11 switching signal.

1 **Claim 28 (previously presented):** A multiband data
2 communication apparatus as claimed in claim 2, wherein said
3 phase shifting means supplies said local oscillation signal
4 to one of said pair of second quadrature mixers, while said
5 phase shifting means supplies one of a signal obtained by
6 delaying the phase of said local oscillation signal by $\pi/2$
7 and a signal obtained by advancing the phase of said local
8 oscillation signal by $\pi/2$ to the other of said pair of
9 second quadrature mixers in response to said band switching
10 signal.

1 **Claim 29 (previously presented):** A multiband data
2 communication apparatus as claimed in claim 7, wherein
3 either said quadrature demodulating means includes clock
4 generating means for generating a clock signal and interval
5 determining means for determining a clock interval used to
6 read out data from said storage means so as to control the
7 address generating operation of said address generating
8 means.

1 **Claim 30 (previously presented):** A multiband data
2 communication apparatus as claimed in claim 8, wherein
3 either said quadrature modulating means includes clock
4 generating means for generating a clock signal and interval
5 determining means for determining a clock interval used to
6 read out data from said storage means so as to control the
7 address generating operation of said address generating
8 means.